**FEDERAL PUBLIC SERVICE COMMISSION**

**COMPETITIVE EXAMINATION-2024 FOR RECRUITMENT**

**TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT**

| **Roll Number** |
|---|
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# STATISTICS

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|---|---|
| **TIME ALLOWED: THREE HOURS**<br>**PART-I(MCQS): MAXIMUM 30 MINUTES** | **PART-I (MCQS) MAXIMUM MARKS = 20**<br>**PART-II MAXIMUM MARKS = 80** |

**NOTE: (i)** **Part-II** is to be attempted on the separate **Answer Book.**

**(ii)** Attempt **ONLY FOUR** questions from **PART-II. ALL** questions carry **EQUAL** marks.

**(iii)** All the parts (if any) of each Question must be attempted at one place instead of at different places.

**(iv)** Candidate must write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.

**(v)** No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.

**(vi)** Extra attempt of any question or any part of the attempted question will not be considered.

ZICOSH

# FEDERAL PUBLIC SERVICE COMMISSION
## COMPETITIVE EXAMINATION-2024 FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT
## STATISTICS

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|---|---|
| TIME ALLOWED: THREE HOURS | (PART-I MCQs) MAXIMUM MARKS: 20 |
| PART-I (MCQs) : MAXIMUM 30 MINUTES | (PART-II) MAXIMUM MARKS: 80 |

**NOTE:** (i) First attempt PART-I (MCQs) on separate OMR Answer Sheet which shall be taken back after 30 minutes.
(ii) Overwriting/cutting of the options/answers will not be given credit.
(iii) There is no negative marking. All MCQs must be attempted.

## PART-I (MCQs)(COMPULSORY)

**Q.1.** (i) Select the best option/answer and fill in the appropriate Box ■ on the OMR Answer Sheet.(20x1=20)
(ii) Answers given anywhere else, other than OMR Answer Sheet, will not be considered.

1. **A study based on complete enumeration is known as:**
(A) Sample survey (B) Pilot survey (C) Census survey (D) None of these
2. **If the estimated value of an item is 50 and its actual value is 60, the relative error is:**
(A) -20 (B) 0.16 (C) 21.2 (D) 0.20
3. **Statistical results are:**
(A) Absolutely correct (B) Not true (C) True on average (D) Universally true
4. **The value 43,572.6 approximated to the thousandth place by adding figure is:**
(A) 43,500 (B) 43,000 (C) 44,000 (D) 44,600
5. **In a grouped data, the number of classes preferred are:**
(A) Minimum possible (B) Adequate (C) Maximum possible (D) Arbitrarily chosen number
6. **The headings of the rows given in the first column of a table are called:**
(A) Stubs (B) Captions (C) Titles (D) Prefatory notes
7. **With the help of ogive curve, one can determine:**
(A) Median (B) Deciles (C) Percentiles (D) All of these
8. **If a constant value is subtracted from each observation of a set, the mean of the set is:**
(A) Increased by 50 (B) Decreased by 50 (C) Is not affected (D) Zero
9. **Extreme value have no effect on:**
(A) Average (B) Median (C) Geometric mean (D) Harmonic mean
10. **In case of weighted mean, the accuracy or utility of the mean:**
(A) Decreases (B) Increases (C) Is unaffected (D) None of these
11. **The individual probabilities of occurrence of two events A and B are known, the probability of occurrence of both the events together will be:**
(A) Increased (B) Decreased (C) One (D) Zero
12. **For a Bernoulli distribution with probability p of a success and q of a failure, the relation between mean and variance that holds is:**
(A) Mean < variance (B) Mean > variance (C) Mean = variance (D) Mean ≤ variance
13. **A random sample of 17 items from a heap of machine parts gives a mean of 42 and S.D.= 6.25. The value of statistic t to test the hypothesis that the population mean = 38 is:**
(A) 2.64 (B) 6.6 (C) 2.56 (D) None of these
14. **The shape of Chi-square distribution curve with 1 or 2 degree of freedom is:**
(A) A parabola (B) A hyperbola (C) J-shaped curve (D) A bell shaped curve
15. **F-distribution curve in respect of tails is:**
(A) Negative skew (B) Positive skew (C) Symmetrical (D) All of these
16. **The distribution for which the moment generating function does not exist but moments exists is:**
(A) Pareto distribution (B) t-distribution (C) F-distribution (D) All of these
17. **If a discrete random variable takes on four values -1, 0, 3, 4 with probabilities 1/6, k, ¼ and 1-6k, where k is a constant, then the value of k is:**
(A) 1/3 (B) 2/9 (C) 1/12 (D) 5/24
18. **If a random variable X has mean 3 and S.D.= 5, then the variance of the variable Y = 2X -5 is:**
(A) 25 (B) 45 (C) 100 (D) 50
19. **Let X has a random variable U(0,1), then the variable y = -2 log X follows:**
(A) Log normal distribution (B) Gamma distribution
(C) Chi-square distribution (D) Exponential distribution
20. **If all observations in a set of observations are same, the variance of the set of values is:**
(A) Zero (B) One (C) Infinity (D) Not possible to calculate

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STATISTICS

## PART-II

**NOTE:** (i) **Part-II** is to be attempted on the separate **Answer Book.**
(ii) Attempt **FOUR** questions in all by selecting **TWO** Questions each from **SECTION.** **ALL** questions carry **EQUAL** marks.
(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.
(iv) Write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
(vi) Extra attempt of any question or any part of the question will not be considered.
(vii) **Use of Calculator is allowed.**

## SECTION-A

**Q. No.2. (a)** What methods you employed in the collection of statistical data when the field of inquiry is (i) small, (ii) fairly large and (iii) very large, if you are to pay due regard to accuracy, labor, cost and time. **(10)**

**(b)** If $\log_e x$ is normally distributed with $\mu = 1$ and $\sigma^2 = 4$, find $P(\frac{1}{2} < x < 2)$, given $\log_e 2 = 0.693$. **(10)** **(20)**

**Q. No.3.** In a certain experiment to compare two types of sheep food A and B, the following results of increase in weights were observed:

| Sheep No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Food A | 49 | 53 | 51 | 52 | 47 | 50 | 52 | 53 |
| Food B | 52 | 55 | 52 | 53 | 50 | 54 | 54 | 53 |

(i) Assuming that the two samples of sheep are independent, can we conclude that food B is better than food A? **(10)**
(ii) Examine the case when the same set of eight sheep was used in both the foods. **(10)** **(20)**

**Q. No.4. (a)** An urn contains 10 white and 3 black balls. Another urn contains 3 white and 5 black balls. Two balls are transferred from first urn and placed in the second and then one ball is taken from the latter. What is the probability that it is a white ball? **(10)**

**(b)** Differentiate between Poisson distribution and Poisson process. Give examples in each case. **(10)** **(20)**

**Q. No. 5.(a)** Given the following population distribution:

| x | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| f(x) | 1/7 | 3/7 | 2/7 | 1/7 |

Find the sampling distribution of the mean if a sample of three numbers is taken without replacement. How does the variance of the sampling distribution compare with the population variance? **(10)**

**(b)** A random sample of size n = 100 is taken from a population having a mean of 20 and a standard deviation of 5. The shape of the population distribution is unknown. **(10)** **(20)**

(i) What can you say about the sampling distribution of the sample mean?
(ii) Find the probability that sample mean exceeds 20.75.

## SECTION-B

**Q. No.6. (a)** A confidence interval is constructed from a random sample of size n = 50, for the mean yield of a normal population which has $\sigma = 21$ tons. The limits for the interval are 866.11 and 875.89 tons. What confidence co-efficient was used? **(10)**

**(b)** How will you construct confidence interval for difference of means of a normal population? **(10)** **(20)**



WORLD TIMES

## STATISTICS

**Q. No.7. (a)** Describe the main steps involved in the construction of index numbers of wholesale prices. **(10)**

**(b)** The prices and quantities of three commodities during 2002 and 2004 are given below: **(10)** **(20)**

| Commodity | Prices (Rs. Per 40 Kilogram) | | Quantities Produced (Kilograms) | |
|---|---|---|---|---|
| | 2002 | 2004 | 2002 | 2004 |
| A | 3.95 | 4.25 | 9,675 | 10,436 |
| B | 34.80 | 38.94 | 78 | 83 |
| C | 61.56 | 59.70 | 118 | 116 |

Compute the Marshall-Edgeworth and the Walsh's price index numbers for 2004, using 2002 as the base period.

**Q. No.8. (a)** Describe a Randomized Complete Block Design experiment and give its layout. **(10)**

**(b)** In a Randomized Complete Block Design, in each of four blocks I, II, III, IV, four varieties of wheat A,B, C, D are grown in the layout given below and the yields are also indicated therein: **(10)** **(20)**

| | | | | |
|---|---|---|---|---|
| I | B 27 | A 17 | C 15 | D 25 |
| II | A 28 | D 22 | B 26 | C 16 |
| III | D 14 | C 11 | A 22 | B 25 |
| IV | C 18 | B 18 | D 19 | A 17 |

(i) Perform the analysis of variance to test at 0.05 significance level, the difference in the yields of varieties and in blocks.

(ii) What would be the result if no blocking had been done. i.e., if we consider it as a completely randomized design?

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